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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

UHLIR, NIKOLAS J

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 12/12/2002

10

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/808,427

Applicant(s)

OIKAWA ET AL.

Examiner

Nikolas J. Uhler

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) 1-23 and 32-36 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 24-31 and 37-39 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,8.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election of the species embodied by claims 24-31 and 37-39 in Paper No. 9 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).
2. Claims 1-23 and 32-36 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 9.

Priority

3. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Rejections - 35 USC § 112

5. Claims 24-31 and 37-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "mainly X" where X in a given claim is ruthenium, palladium, or platinum in claims 24-31 and 37-39 is a relative term that renders the claim indefinite. The term "mainly" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one

of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Specifically, it is unclear to the examiner **exactly how much of the required element X is required** to be in the specified layer for the layer to be considered to be composed of "mainly X." Clarification is required.

6. Claims 25 and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In the instant case, the applicant in claims 25 and 26 recites that the 1st underlayer can be "substantially elemental titanium." It is unclear to the examiner what "substantially elemental" is claiming. Specifically, it is unclear what amount of impurities/other elements can be present in the titanium layer for the titanium layer to still be considered "substantially elemental titanium." Clarification is required.

7. Claims 37-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In the instant case, claim 37 requires a magnetic recording medium having a magnetic layer that has a multilayer structure prepared by alternately laminating a ferromagnetic layer and a non-magnetic layer. It is unclear to the examiner whether the applicant is intending to claim a magnetic layer that comprises only two layers, namely a non-magnetic layer and a magnetic layer, or whether the applicant really wishes to claim a magnetic layer that comprises 3 layers, i.e. a magnetic layer, a non-magnetic layer, and a magnetic layer. While the claim language as written indicates a magnetic layer having 2 layers, the specification and the

drawings (particularly drawing 2) only support a magnetic layer having 3 layers.

Clarification is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 24-27, and 37-38 are rejected under 35 U.S.C. 102(b) as being anticipated by Honda et al. (US5851643).

10. Regarding the limitations of claim 24, wherein the applicant requires a magnetic recording medium comprising a non-magnetic substrate, a first underlayer containing titanium formed on the non-magnetic substrate, a second underlayer formed of mainly ruthenium on the first underlayer, and a magnetic recording layer formed of mainly cobalt on the 2nd underlayer.

11. Honda et al. teaches a magnetic recording medium (as shown by figure 5) that comprises a washed glass substrate 21 (equivalent to applicants claimed non-magnetic substrate), a structural control underlayer 22 (equivalent to applicants 1st underlayer), a first magnetic film 23, an intermediate layer 24 (equivalent to applicants 2nd underlayer), and a 2nd magnetic film 25 (equivalent to applicants claimed magnetic recording layer) formed in that order on the substrate. In a specific embodiment, the structural control underlayer 22 is a Ti-Cr alloy (thus meeting the requirement that the 1st underlayer contain titanium), the intermediate layer 24 is ruthenium (thus meeting

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the requirement that the 2nd underlayer comprise "mainly" ruthenium), and the 2nd magnetic layer is a CoCrPt film (column 17, lines 20-61 and figure 5). Thus, the limitations of claim 24 are met.

12. Regarding the limitations of claims 25 and 26, wherein the applicant requires the first underlayer to be selected from the group consisting of a nitride of titanium, a titanium chromium alloy, or substantially elemental titanium. These limitations are met as set forth above for claim 24, as Honda et al. clearly teaches a 1st underlayer that is a TiCr alloy.

13. Regarding the limitations of claim 27, wherein the applicant requires the magnetic recording layer to further contain at least one element selected from Cr and Pt. This limitation is met as set forth above for claim 24, as the 2nd magnetic layer taught by Honda et al. is a CoCrPt alloy.

14. Regarding the limitations of claim 37, wherein the applicant requires a magnetic recording medium comprising a non-magnetic substrate, and a magnetic recording layer formed on the non-magnetic substrate, wherein the magnetic layer has a multilayer structure prepared by alternately laminating a ferromagnetic layer containing mainly cobalt and a non-magnetic layer containing mainly ruthenium.

15. This limitation is met as set forth above for claim 24, as Honda et al. clearly teaches a magnetic recording medium that comprises a layer of ruthenium that is alternately laminated with a Co based ferromagnetic layer.

16. Regarding the limitations of claim 38, wherein the applicant requires the ferromagnetic layer to further comprise at least Cr or a mixture of Cr and Pt. This

limitation is met as set forth above for claim 24, as Honda et al. clearly teaches that the 2nd magnetic layer is a CoCrPt alloy.

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. Claims 24-27, 29-31 and 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Futamoto et al. (US6183893) in view of Honda et al.

19. For the purpose of clarity, the Honda reference cited here is the same as the Honda et al. reference cited above.

20. Regarding the limitations of claim 24, wherein the applicant requires a magnetic recording medium comprising a non-magnetic substrate, a first underlayer containing titanium formed on the non-magnetic substrate, a second underlayer formed of mainly ruthenium on the first underlayer, and a magnetic recording layer formed of mainly cobalt on the 2nd underlayer.

21. With respect to these limitations, Futamoto et al. teaches a magnetic recording medium that comprises a non-magnetic substrate 41 (equivalent to applicants claimed non-magnetic substrate), a 1st underlayer 42 (equivalent to applicants claimed 1st underlayer), a second underlayer 43 (equivalent to applicants 2nd underlayer), a lower perpendicular magnetic layer 44, an interlayer 45, and an upper perpendicular magnetic

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layer 46 (column 10, line 66-column 1, line 12 and figure 4). The 1st underlayer is formed of either Ti or Ru (column 9, lines 16-26). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize Ti to form the 1st underlayer due to the teaching in Futamoto et al. of the equivalence of Ti and Ru as suitable materials for forming the first underlayer. The second underlayer is made of a non-magnetic material having a hexagonal close packed structure, or a weak magnetic material having a hexagonal close packed structure. Futamoto et al. teaches that Co based materials having a HCP structure are suitable for this purpose (column 9, lines 27-35)

22. Futamoto et al. does not teach a second underlayer that is formed of mainly ruthenium, as required by claim 24.

23. However, Honda et al. teaches a magnetic recording medium that utilizes an HCP underlayer. Honda et al. teaches that suitable materials for forming the HCP underlayer include Ru and Co-based materials with an HCP structure (column 17, lines 20-35).

24. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Ru as taught by Honda et al. as the material for the second underlayer taught by Futamoto et al.

25. One would have been motivated to make such a modification due to the teaching in Honda et al. of the equivalence of Ru to Co-based underlayers (having an HCP structure) as suitable materials for forming an HCP underlayer in a magnetic recording medium. One would have further been motivated to make this modification due to the

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teaching in Futamoto et al. that the second underlayer is made of a non-magnetic material having a hexagonal close packed structure, and the fact that Ru is known to be both non-magnetic and have an HCP crystal structure.

26. Regarding the limitations of claims 25 and 26, wherein the applicant requires the first underlayer to be selected from the group consisting of a nitride of titanium, a titanium chromium alloy, or substantially elemental titanium. These limitations are met as set forth above for claim 24.

27. Regarding the limitations of claim 27, wherein the applicant requires the magnetic recording layer to further contain at least one element selected from Cr and Pt. Futamoto et al. teaches in every example presented that utilizes two magnetic layers that both of the magnetic layers comprise at least Co and Cr (see columns 13-17, examples 2 and 4). Thus, the limitations of claim 27 are met.

28. Regarding the limitations of claim 29, wherein the applicant requires the magnetic recording layer to have a multilayer structure prepared by alternately forming a ferromagnetic layer containing cobalt and a non-magnetic layer containing one element selected from the groups consisting of platinum, palladium, and ruthenium. Futamoto et al. teaches that the intermediate layer is formed so as to reduce the noise of the magnetic layers (column 10, lines 15-27). The only example of a material suitable for the intermediate layer given by Futamoto et al. is in example 2, wherein a CoRu film is utilized for this purpose. Thus, the limitations of claim 29 are met, as the intermediate layer of Futamoto et al contains Ru.

29. Regarding the limitations of claims 30 and 31, wherein the applicant requires a soft magnetic layer to be present between the substrate and the 1st underlayer (claim 30), wherein the soft magnetic layer is selected from the group consisting of an FeAlSi series alloy, an FeTaC series alloy, an FeZrN series alloy, a CoZrNb series alloy, and an FeC series alloy.

30. Futamoto et al. does not teach a soft magnetic layer between the substrate and the first magnetic layer as required by claim 30, wherein the soft magnetic alloy has one of the compositions required by claim 31.

31. However, Honda et al. teaches a magnetic recording medium comprising a substrate 21, a soft magnetic layer 49, a structural control underlayer 22, and a multilayer magnetic film (Figure 13). The soft magnetic layer can be formed from amorphous soft magnetic materials such as Sendust, which is a known alloy of Fe, Si, and Al. A recording media utilizing this structure exhibits high-read-back output and low noise (column 23, lines 50-67).

32. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to utilize a soft magnetic underlayer such as Sendust, as taught by Honda et al. between the non-magnetic substrate and the 1st underlayer of the magnetic recording material taught by Futamoto et al.

33. One would have been motivated to make this modification due to the teaching in Honda et al. that magnetic recording media utilizing a soft magnetic layer between the substrate and an underlayer exhibit high-read-back output and low noise, and that Sendust (a known FeSiAl alloy) is a suitable soft magnetic material for such this

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purpose. One would have been further motivated to make this modification due to the fact that Futamoto et al. is concerned with obtaining a recording media that has low noise (column 10, lines 15-27 of Futamoto et al.).

34. Regarding the limitations of claim 37, wherein the applicant requires a magnetic recording medium comprising a non-magnetic substrate, and a magnetic recording layer formed on the non-magnetic substrate, wherein the magnetic layer has a multilayer structure prepared by alternately laminating a ferromagnetic layer containing mainly cobalt and a non-magnetic layer containing mainly ruthenium.

35. The limitations of claim 37 that are directed towards the non-magnetic substrate and the structure of the magnetic layer (alternating magnetic layer and non-magnetic layer) are met as set forth above for claim 24. Regarding the limitation in claim 37 requiring that the ferromagnetic layer comprise "mainly" cobalt, Futamoto et al. teaches that the perpendicular magnetic films are made of a Co alloy containing one of a number of additive elements (column 9, lines 45-58). Specifically, in every one of the examples provided by Futamoto et al., the magnetic layers contain more cobalt than any other element. Thus, the examiner takes the position that the limitation in claim 37 requiring the magnetic layer to be comprised of "mainly" cobalt is met.

36. Futamoto et al. does not teach an intermediate layer that is "mainly" ruthenium, as required by claim 37.

37. However, Honda et al. teaches a magnetic recording medium that comprises stacked magnetic layers that are separated by a non-magnetic intermediate layer (column 5, lines 45-47). Honda et al. teaches that Ru is a suitable non-magnetic

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intermediate layer, along with Ti, Hf, Co, or alloys of one of these with at least one of Cr, V, Ti, Ru, etc... (i.e Co-Ru) (column 17, lines 54-61).

38. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to use Ru as taught by Honda et al. as the intermediate layer of Futamoto et al.

39. One would have been motivated to make this modification due to the teaching in Honda et al. of the equivalence of Ru to an alloy of Co with one of Cr, V, Ti, Ru, etc. as a suitable material for forming the intermediate layer between 2 magnetic layers in a magnetic recording medium, and the fact that the only example of an intermediate layer in Futamoto et al. Co-Ru.

40. Regarding the limitations of claim 38, wherein the applicant requires the ferromagnetic layer to contain at least one of chromium and a combination of chromium and platinum. Futamoto et al. teaches in all of the product examples (examples 1-5) that the perpendicular magnetic recording layers contain at least cobalt and chromium. Thus, the examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a magnetic layer that contains both Co and Cr, as Futamoto et al. clearly shows that these are suitable alloys.

41. Claims 28 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Futamoto et al. as modified by Honda et al. as applied to claims 24 and 27 above, and further in view of Suzuki et al.

42. Futamoto et al. as modified by Honda et al. does not teach a magnetic recording layer that comprises Co, Pt and O, as required by claims 28 and 39.

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43. It should be noted that Futamoto et al. does teach a specific example in which a CoCrPt alloy is used to form the 1st and 2nd magnetic layers (column 13, example 2). In light of this fact, the examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a CoCrPt alloy to form the 1st and 2nd magnetic layers of Futamoto et al., as this alloy is clearly shown to be suitable for this purpose by example 2.

44. Further, with respect to the requirement in claims 28 and 39, requiring the magnetic layers to contain Pt and O, Suzuki et al. teaches that the noise of a magnetic layer can be reduced by incorporating 0.1-15% of oxygen into the magnetic layer (column 3, line 66-column 4, line 5).

45. Therefore it would have been obvious to one with ordinary skill in the art at the time the invention was made to incorporate oxygen as taught by Suzuki et al. into the magnetic layers taught by Futamoto et al. as modified by Honda et al.

46. One would have been motivated to make this modification due to the teaching in Suzuki et al. that media noise is reduced by incorporating oxygen into a magnetic layer, and because Futamoto et al. is concerned with obtaining a recording media that exhibits low noise.

47. Thus, the limitations of claims 28 and 29 are met when oxygen is added to the CoCrPt alloys taught by Futamoto et al. as modified by Honda et al.

Conclusion

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhler whose telephone number is 703-305-0179. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on 703-308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-0389.

MSU

nju
December 6, 2002



STEVAN A. RESAN
PRIMARY EXAMINER